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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/733,231	12/12/2003	Tatsuo Kozakaya	7906.0020	9476

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EXAMINER	
HUNG, YUBIN	
ART UNIT	**PAPER NUMBER**
2624	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/733,231	KOZAKAYA ET AL.	
	Examiner	Art Unit	
	Yubin Hung	2624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-14* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-14* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *31 March 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *All 3 thru 4/19/07*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Objections

1. Claim 11 is objected to because of the following informalities

- Claim 11, line 9: "extracted one" should have been "extracted by one"

Appropriate correction is required.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 1-4 and 6-12 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

4. Claim 1 recites the limitation "the person" in line 12. Since it is not clear whether it is the person in line 3 or line 10 that is being referred to, the mete and bound of the claim cannot be ascertained. Claims 2 and 3 are similarly rejected due to dependency.

5. Claim 2 recites the limitation "the image" in line 2. Since a camera can pick up more than one image, it is not clear which one is being referred to and therefore the mete and bound of the claim cannot be ascertained. Claim 3 is similarly rejected due to dependency.

6. Claim 3 recites the limitation "the other" in line 5 and claims 4 and 6 recite the same in their respective line 7. Since a plurality can be more than 2, it is not clear which one is being referred to and therefore the mete and bound of the claim cannot be ascertained.

7. Claim 4, and similarly claims 7 and 12, recites the limitation "the person" in the 3rd and 4th lines from the end. Since there are two sets of face feature each implicitly corresponding to a (possibly different) face, it is not clear which one is being referred to and therefore the mete and bound of the claim cannot be ascertained.

8. Claim 6 recites "to convert one of the plurality of face feature points to the other of the plurality of face feature points" in lines 6-8. The meaning of converting one feature point to another is not clear and therefore the mete and bound of the claim cannot be ascertained. [Note: Fig. 7, refs. S4-S6; P. 26, lines 10-25 and P. 27, line 10-P. 28, line 4 describe establishing corresponding relationship among feature points to determine its 3-D coordinates and then projects the 3-D coordinates into the coordinate system of a camera to which the feature point cannot be extracted (e.g., because it's

obscured and therefore not visible to the camera); in other words, predicts where the feature point would have been in the image captured by that camera. However, since the predicted feature point is cannot be extracted, it is not among "the plurality of face feature points;" therefore converting one of the plurality of face feature points to "the other of the plurality of face feature points" does not make sense.]

9. Claim 7 recites the limitation "the face region" in line 9. Since there are more than one face regions (per lines 4-6), it is therefore not clear which one is being referred to, and the mete and bound of the claim cannot be ascertained. Claims 8-10 are similarly rejected due to dependency.

10. Claim 7 further recites the limitation "a face feature from images" in lines 8 and 9. Since it can be construed either as "one feature from all the images combined" or "one feature per image," ambiguity arises and the mete and bound of the claim cannot be ascertained. Claims 8-10 are similarly rejected due to dependency.

11. Claim 8 recites the limitation "a plurality of the face features" in lines 5 & 6. There is insufficient antecedent basis for this limitation in the claim (since claim 7 only recite "a face feature" in lines 8 and 9). Claim 9 is similarly rejected due to dependency.

12. Claims 9-11 recite the limitation "the other" in line 4, line 4 and line 10, respectively. Since a plurality can be more than 2, it is not clear which one is being referred to and therefore the mete and bound of the claim cannot be ascertained.

13. Claim 10 recites the limitation "the corresponding face feature point" in the last two lines. Since more than one face feature point have been recited ("one of" in line 3 and "the other" in line 4), it is not clear which one is being referred to and therefore the mete and bound of the claim cannot be ascertained.

14. Claim 11 recites the limitation "the face feature point" in the 2nd line from the end. Since more than one face feature point have been recited (in lines 8 and 10, respectively), it is not clear which one is being referred to and therefore the mete and bound of the claim cannot be ascertained.

Claim Rejections - 35 USC § 103

15. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

16. Claims 1, 4, 6, 12 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Prokoski (US 6,920,236) and in view of Li (US 7,155,036).

17. Regarding claim 1, and similarly claim 12, Prokoski discloses an apparatus that uses multiple imaging devices [Fig. 12A, refs. 102 & 202 and Fig. 13, ref. 302 (imaging units)] that comprises

- a face feature extracting unit configured to extract a face feature from an image of the face region detected by the face region detecting unit
  [Fig. 13, refs. 304 & 404 (collectively the face feature extracting unit); Col. 13, lines 45-50. Note that refs. 304 and 404 each generates a morph facial image, which is a face feature *per se* (see P. 12, lines 10-12 of the instance application)]
- a person recognizing unit configured to calculate a similarity measure based on a face feature of a specific person being previously registered and the face feature extracted by the face feature extracting unit to recognize the person
  [Fig. 13, ref. 324; Col. 14, lines 23-25]
- an output apparatus which outputs a recognition result in the person recognizing unit
  [Fig. 13, ref. 325; Col. 14, lines 25-26]

Prokoski does not expressly disclose the following, which is taught by Li

- a face region detecting unit configured to detect a face feature point of a person from a plurality of images picked up by a plurality of imaging units respectively, to detect a face region
  [Fig. 1, refs. 120 & 124 (feature points) and 134-140 (detect face); Col. 4, line 36-Col. 6, line 6. Note that Prokoski already discloses multiple images from multiple imaging units]

Prokoski and Li are combinable because they both have aspects that are from the same field of endeavor of face detection.

At the time the invention, it would have been obvious to one of ordinary skill in the art to modify Prokoski as recited above. The motivation would have been to be able to augment the capability of Prokoski's invention by providing the ability to extract faces from images when other parts of a human body is also captured by the imaging units (as is common in a surveillance application), as well as to overcome problems encountered in traditional face detection techniques, as Li indicates in Col. 1, line 34-Col. 2, line 2.

Therefore, it would have been obvious to combine Li with Prokoski to obtain the invention as specified in claim 1.

18. Regarding claim 4, note that per the analysis of claim 1 above, Li discloses detecting multiple feature points [Fig. 1, refs. 120 and 124]. In addition, Prokoski further discloses predicting a feature point from another [Fig. 12A, refs. 148, 150 & 254; Col. 12, lines 47-59; note that the eye line is considered the predicted feature point] and detecting at least two face feature regions [Fig. 12A, refs. 110 (from IR camera) & 210 (from visual camera); Fig. 13, refs.304 & 404]. Since Li relies on feature points to detect face regions, it would have been obvious to one of ordinary skill in the art to modify the combined invention of Prokoski and Li with Prokoski's disclosure above to predict (the missing) feature points that are needed by Li in order to successfully detect face regions. (Note that face feature extraction, person recognition and output units have all

been disclosed in the combined invention of Prokoski and Li, per the analysis of claim 1 above.)

19. Regarding claim 6, and similarly claim 14, note that the combined invention of Prokoski and Li discloses the recited detecting unit (per the analysis of claim 1). Note further that using stereo matching (or other similar triangulation techniques) to determine 3-D coordinates of a feature point as appeared on multiple images (e.g. a stereo pair) is well known in the art. In addition, projecting a 3-D point onto to a camera's image plane as seen from a given viewpoint to predict its image coordinates is also well known. Therefore it would have been obvious to apply the techniques in order to estimate where a face feature point would have been in the image captured by a camera to which that feature point is not visible. [See, for example, JP 2000-163469 and JP 59-182689 (as citations 2 and 3 in the English translation of JPO Office action filed 04/19/07) and the discussion on applying these patents to claim rejections in the JPO Office action. Note that both the above–cited patents and Office action are part of the IDS.]

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20. Claims 2 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Prokoski (US 6,920,236) and Li (US 7,155,036) as applied to claims 1 and 12 above, and further in view of Howard et al. (US 2004/0213437).

Regarding claim 2, and similarly claim 7, the combined invention of Prokoski and Li discloses all limitations of its parent, claim 1 but not the following

- wherein the face region detecting unit includes a plurality of face region detecting sections each configured to detect the face feature point of the person from the image picked up by one of the plurality of imaging units to detect the face region
- the face feature detecting unit includes a plurality of face feature extracting sections each configured to extract the face feature from the image of the face region detected by one of the plurality of face detecting sections

However, Howard discloses using multiple units to perform the same task such as face recognition and eye (a face feature) detection [Fig. 16, refs. 1218-1222 and Col. 14, lines 23-25].

The combined invention of Prokoski and Li is combinable with Howard because they both have aspects that are from the same field of endeavor of face recognition.

At the time the invention, it would have been obvious to one of ordinary skill in the art to modify the combined invention of Prokoski and Li with Howard by using multiple sections for the face region detecting unit, as well as for the face feature extracting unit. The motivation would have been to improve the processing speed by doing face region detection and feature extraction from multiple images in parallel, as would have been obvious to one of ordinary skill in the art.

Therefore, it would have been obvious to combine Howard with Prokoski and Li to obtain the invention as specified in claims 2 and 7.

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21. Claims 5 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Prokoski (US 6,920,236) and Li (US 7,155,036), and further in view of Nakamura (US 7,212,233).

Regarding claim 5, and similarly claim 13, per the analysis of claim 1 above the combined invention of Prokoski and Li discloses the recited face region detection unit but not the following:

- a predicting unit configured to compare a feature of the detected face feature region with respective features of a face feature region of a person facing towards a plurality of predetermined directions to detect a face direction of the face

However, Nakamura discloses a unit that compares a feature of a face region with respective features (as encoded in detection network) to detect a face direction [Fig. 2, ref. 102 (prediction unit); Fig. 4, refs. 204-204B (features of faces facing different directions) and 206A-206C (detection networks); Fig. 5, refs. S14-S18; Fig. 7 (learning to build the detection network) and Fig. 9 (comparing); Col. 6, line 38-Col. 8, line 46. Note that the feature used is created in S22 of Fig. 7 and S33 of Fig. 9, respectively].

The combined invention of Prokoski and Li is combinable with Nakamura because they both have aspects that are from the same field of endeavor of face recognition.

At the time the invention, it would have been obvious to one of ordinary skill in the art to modify the combined invention of Prokoski and Li with Nakamura as recited above. The motivation would have been to provide the ability to obtain images when the subject is in a desired pose, as Nakamura indicates in Col. 1, lines 53-56.

Therefore, it would have been obvious to combine Nakamura with Prokoski and Li to obtain the invention as specified in claim 5.

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22. Claim 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Prokoski (US 6,920,236), Li (US 7,155,036) and Howard et al. (US 2004/0213437) as applied to claims 2 and 7 above, and further in view of Nakamura (US 7,212,233).

Regarding claim 10, the combined invention of Prokoski, Li and Howard discloses all limitations of its parent, claim 7.

The combined invention does not expressly discloses the following:

- a predicting unit configured to compare a feature of the detected face feature region with respective features of a face feature region of a person facing towards a plurality of predetermined directions to detect a face direction of the face

However, Nakamura discloses a unit that compares a feature of a face region with respective features (as encoded in detection network) to detect a face direction [Fig. 2, ref. 102 (prediction unit); Fig. 4, refs. 204-204B (features of faces facing different

directions) and 206A-206C (detection networks); Fig. 5, refs. S14-S18; Fig. 7 (learning to build the detection network) and Fig. 9 (comparing); Col. 6, line 38-Col. 8, line 46. Note that the feature used is created in S22 of Fig. 7 and S33 of Fig. 9, respectively].

The combined invention of Prokoski, Li and Howard is combinable with Nakamura because they both have aspects that are from the same field of endeavor of face recognition.

At the time the invention, it would have been obvious to one of ordinary skill in the art to modify the combined invention of Prokoski, Li and Howard with Nakamura as recited above. The motivation would have been to provide the ability to obtain images when the subject is in a desired pose, as Nakamura indicates in Col. 1, lines 53-56.

Therefore, it would have been obvious to combine Nakamura with Prokoski, Li and Howard to obtain the invention as specified in claim 10.

Allowable Subject Matter

23. The following is an examiner's statement of the indication of allowable subject matter:

A. Regarding claim 3, and similarly claim 8, prior art of record, alone or in combination, does not disclose, teach or suggest comparing a face feature extracted from different images to determine whether the subject being imaged is a photograph. Prokoski discloses using IR images to determine whether the subject is a live face or not, but not whether it is a photograph. In addition, Fan et al. ("Picture/Graphics Classification Using Texture Features," SPIE, Vol. 4663, 2002, PP. 81-85) discloses determining whether an image corresponds to a natural object or synthetic graphics; however, it does not compare features from images obtained by different cameras. Claim 9 inherits this subject matter from claim 8

B. Regarding claim 11, prior art of record, alone or in combination, does not disclose, teach or suggest recognizing a person only after determining that the same person is indicated by the feature points extracted from two different images. Kaku (US 7,035,440) discloses identifying the same person from images captured by multiple cameras [Fig. 22, ref. 308], but does not using it as a criterion as to whether to recognize the person or not.

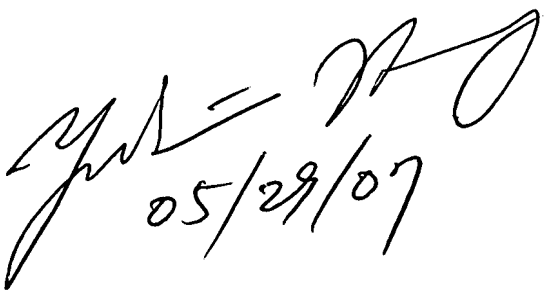
Conclusion and Contact Information

24. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

- Fukui et al. (US 6,466,685) – discloses detecting face regions using template matching or color and subsequent extraction of features for recognition [Fig. 4; Col. 7, line 66-Col. 8, line 11]
- Engels et al. (US 7,215,798) – discloses determining whether a captured fingerprint image is from a live finger or not [Fig. 2B]

25. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Yubin Hung whose telephone number is (571) 272-7451. The examiner can normally be reached on 7:30 - 4:00. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew C. Bella can be reached on (571) 272-7778. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

26. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



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